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SOIL CONSERVATION SERVICE

SUMMARY REVIEW OF MONTHLY REPORTS¹
FOR
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EROSION CONTROL PRACTICES DIVISION

Mulch Culture vs. Plowing - H. L. Borst, Wooster, Ohio

"The average corn yield from all three treatments in six replications of the mulch-culture plots was 98 bushels per acre and the average yield of the plowed plots also was 98 bushels. The mulch culture plots were prepared with the field cultivator and the disk. This is the second year in which the mulch culture treatment had produced as well as conventional preparation. Weather has doubtless played a part but it appears that progress in handling mulch culture is being made. It is apparent that in the first 3 years of this work when the mulch culture treatment made poor yields the seedbed surface of the soil was not well prepared. Attention was then directed more to the preparation of the rootbed. Following the field cultivator preparation with a thorough disking not only cuts up the sod residue so that planting is facilitated but the surface soil is firmed so that good germination and emergence result.

Manure Topdressing - "This is the third year that manure topdressing after planting has been tried with good success as regards both yield and erosion control. Runoff plots in corn topdressed with manure after planting have lost negligible amounts of soil. It appears that this method of controlling erosion on sloping cornland is practical and ready for field trials. Most all farmers have plows and many have a supply of manure available in the spring. Hitherto weed control with this treatment seemed to present an almost insurmountable problem. The advent of 2,4-D and the experience that manure on the soil surface does not prevent cultivation (which is necessary on some soils even in the absence of weeds) make weed control a minor problem.

Contour vs. Slope Culture Field Trials - "Ten contour vs. slope culture field trials were harvested in 6 districts. All of these trials were conducted on poorly drained soils where contouring has in some instances depressed yields. This season, with its dry August, the contour plots outyielded the non-contour plots in 6 of the trials. In 3 trials the reverse was true and in one trial there was no difference. The fact that even in a dry season contouring may depress yields is of interest and indicates that some change in erosion control recommendations for our poorly drained soils should be made."

Tomato Yields - O. R. Neal, New Brunswick, N. J.

"During recent years yields of tomatoes grown in rotation with a grass-legume sod

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²All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

and with winter cover have averaged 34 percent higher than yields under continuous cultivation with no winter cover crop. Soil and water losses have been greatly reduced by the sod rotation. Average soil and water losses for past years and tomato yields for 1951 are shown below:

Table 1.--Influence of sod rotation on soil and water losses and tomato yield.

Treatment	Soil loss ¹	Water loss ¹	Tomato yield
	<u>Lbs./A.</u>	<u>Inches</u>	<u>T./A.</u>
Continuous cultivation	4,400	4.15	10.2
Sod rotation and winter cover	1,780	1.31	15.0

¹Average growing season losses.

"In order to emphasize the economic aspects of this soil and conservation management practice, there follows a statement which we prepared some months ago, and the title of the statement is 'The Relationship of Acre Yield to Net Returns.'

"The following table is taken from 'Economic Factors in Processing-tomato Production,' N. J. Agricultural Economics Circular 117, June 1950.

Table 2.--Operator's labor earnings per acre for different levels of yield

With yields per acre	Operator's labor earnings per acre
25% below state average	\$ - 8
State average (10-year)	17
25% above state average	40
50% above state average	64
75% above state average	86
100% above state average	110

"Our data from the Marlboro station show that tomatoes in a 3-year rotation which includes 1 year of a clover-timothy mixture have averaged a 34 percent higher yield than have tomatoes grown on continuously cultivated land. For the purpose of this discussion the yield from continuously cultivated land is considered as the state average value in the above table. Thus, for every 3 acres of land, the grower who practiced continuous cultivation would have a net return of 3 x \$17 or \$51. The grower following the sod rotation would have a return of 2 x \$48 or \$96. This would be reduced by taxes and seeding costs on the additional acre, but would still appear to leave a favorable margin.

"At the same time the grower following the sod rotation would have taken an important step toward soil and water conservation and maintenance of future crop yields. Yields from the continuously cultivated land can be expected to decline as erosion continues and as physical conditions of the soil deteriorate.

"Sweet corn yields have shown a 46 percent increase in the sod rotation as compared with yields from continuously cultivated land. With this crop the spread in returns between the two systems of soil management would be considerably greater than from tomatoes.

"The above is an admittedly oversimplified discussion of economic factors. The principle involved, however, is extremely important. Large increases in net returns may come about as a result of only moderate increases in acre yield. Most of our conservation practices, whether the soil-management type or the mechanical type, result in yield increases. I think we all should understand and should emphasize this yield-return relationship in discussing conservation matters."

Combined Subsoil Treatments - D. D. Smith, Columbia, Mo.

"Combined subsoil treatments of shattering, liming, and rockphosphating resulted in a 4 bushels per acre increase in corn yield during 1951. This is the same increase as measured in previous years. Shattering without the fertility treatment resulted in a 15-bushel decrease. There was not a significant difference in soybean yields this year, in contrast to the 3-bushel increase secured with the combined deep treatments in the 3 previous years."

Sugarcane Planting - J. Vicente-Chandler, Rio Piedras, Puerto Rico

"Next spring at Aguirre we are planning to try several methods of sugarcane planting other than in the bottom of the irrigation furrows where it interrupts the flow of water. Some general information regarding water movement from the furrows to the ridges, rate at which the ridges dry out following irrigation, etc., was believed desirable in connection with these trials.

"Ridges in the irrigated fields at Aguirre are about 1 foot high and 5 feet apart at their centers. The land slopes more or less evenly from the top of ridges to the bottom of the furrows. The ridges are usually rather well compacted as the tractor wheels pass over them during cultivation.

"A simple experiment is being carried out on Santa Isabel clay soil using tensiometers and nylon blocks to get some general information along these lines. The applicability of the findings to other soils of the region are being tested by means of soil samples. Despite the expected wide variations between soil types, locations, etc., some interesting information is being obtained. When the ridges as described are wetted from both sides as is the common practice in general, all the soil is well wetted up to at least 4 inches of the ridge top. Most of the water movement occurs during the first half hour. When water is applied to only one side of the ridge the upper 8 inches of soil is wetted little if at all. Some water may move across the entire ridge, but it emerges not much higher than at the level of the furrow bottom. The water movement into the ridge is closely related to the time the water can be held in the furrow. If it drains away rapidly the ridge will not be well wetted.

"The rate at which the ridges and furrows dry out following irrigation is now being studied. As far as soil-moisture conditions are concerned it would appear feasible to grow the cane on the ridges as now built. Growing two rows of cane on 5-foot wide, relatively low, flat topped banks also appears possible. Better results could probably be obtained if the permeability of the furrows would be reduced somewhat in order to allow sufficient time for the water to move into the banks."

Sweet-Clover Methods - F. H. Siddoway, St. Anthony, Idaho.

"Crop-residue weight measurements were taken on the different methods of handling sweet clover as a green manure crop. The sweet clover was plowed June 25, 1951. The sweet clover was approximately 18 inches high and yielded 1-1/2 tons per acre air dry weight at this time. The major portion of this residue was left on the surface when plowed with the subsurface sweep plows. A negligible amount remained after being plowed with the moldboard and the amount remaining after the one-way disk was intermediate between the other two methods.

"The month of July was abnormally dry and little decomposition took place. However, during all of August and the first part of September, rainfall was frequent and the surface soil was continuously wet. This wet condition, along with the high temperatures and the high nitrogen content of the sweet-clover residues, caused rapid decomposition. The plots with the most surface residue remaining (clipping before subsurface plowing) had only 581 pounds of residue left when sampled October 1, 1951. The upper half of the plots was rodweeded and drilled with winter wheat and the lower half was left rough and will be seeded next spring. The effect of the rod weeding and drilling operations on the amount of residue is presented in the following table:

Table 1.--Amount of sweet-clover residue remaining on surface October 1, 1951

Method of tillage	Rod weeded and drilled	Left rough. No tillage operations following plow	% remaining after rod- weeded and drilled
	<u>Lbs/acre</u>	<u>Lbs/acre</u>	<u>Percent</u>
Moldboard plowing	37	51	73
Disk before subsurface plowing	196	402	49
Disk after subsurface plowing	142	194	73
One-way disk plowing	123	166	74
Clip before subsurface plow	320	581	55
Offset disk twice - shallow first, deep second ¹	149	180	83

¹This method did not give satisfactory sweet-clover kill and it was necessary to replot with subsurface sweep.

"The methods of handling the sweet clover that left the larger amounts of residue on the surface lost a larger percentage of the weight by later tillage operations than those methods that left little residue.

"When the original dry weight of the sweet-clover residues at plowing time are compared with the weights sampled October 1, it would appear little residue was left for erosion control. The data are misleading in this respect. Although there was a large reduction in total weight, the residue is still present and effective. The volume weight of the sweet-clover residue was decreased but there is still an ample quantity of the more resistant portions of the plant remaining for erosion control.

"Due to the brittle nature of the sweet-clover residue when rod weeded and drilled, no plugging or other difficulty was encountered in these operations. A 7-inch single disk drill was used to seed the winter wheat."

Dryland Pastures - O. K. Barnes, Laramie, Wyo.

"In 1950 five new dryland pastures were established at Archer for the purpose of determining the value of various grasses and legumes when grazed in the fall and winter. In spite of a dry year during 1950, good stands became established.

"Dual use was made of these new pastures in 1951. In June the pastures were cut for hay and the summer-fall regrowth grazed by sheep in the fall. The following hay yields were obtained from these pastures in 1950.

	<u>Lbs/Acre</u>
Intermediate wheatgrass	390
Intermediate wheatgrass and alfalfa	803
Russian wildrye grass and alfalfa	¹ 435
Stiffhair wheatgrass and alfalfa	740
Crested wheatgrass and alfalfa	743

¹Due to habit of growth on Russian wildrye, little grass was cut; most of this yield was alfalfa.

"Experimental grazing with ewe lambs started September 27 on these pastures. Proper utilization was obtained by November 6 and grazing was discontinued. The following animal gains and stocking rates were obtained from these pastures in 1951.

<u>Pasture</u>	<u>Av/Head</u> <u>enter. wt.</u>	<u>Av/Head</u> <u>final wt.</u>	<u>Av/Gain</u> <u>per head</u>	<u>Av. Gain</u> <u>per acre</u>	<u>Grazing rate</u> <u>sheep da/acre</u>
Inter. wheatgrass	77.8	90.1	12.3	15.4	50
Inter. wheat. & alf.	¹ 73.8	87.1	13.3	16.6	50
Russ. wildrye & alf.	77.7	89.6	11.9	14.9	50
Stiffhair wheat. & alf.	78.5	91.7	13.2	16.5	50
Crested wheat. & alf.	78.4	91.9	13.5	16.9	50
Native Range	77.4	78.8	1.4	1.8	¹ 28

¹The native range pasture being larger was not fully utilized, therefore a comparison of native range grazing rate to the seeded pastures is not fair. The rate simply indicates that the native pasture had ample feed; proper use on native pastures this year allowed 40 sheepdays of grazing per acre.

"The results from the seeded pastures this year show a hay yield of about 400 to 800 pounds per acre and a grazing capacity about 25 percent above properly used native pastures this year. The animal gains were much better on the seeded pastures. The seeded pastures had green feed right up to the end of the grazing season, November 6, whereas the native range was dried up.

Terrace Systems - F. W. Schaller, Ames, Iowa

"This has been an excellent year to observe the terrace systems at the (Council) Bluffs Fruit Farm since rainfall has been unusually heavy. In April, May, and August the monthly rainfall exceeded 7 inches. During June and July it was about

5 inches. There were several storms of high intensity.

"The terraces have functioned well throughout the season. All the water from each storm was held on the fields. No over-topping was observed. However, some damage occurred to the terraces due to water following the burrows of gophers or other rodents. This caused channels to be formed under or through terrace ridges and some wash-outs resulted.

"Visual observation indicated that as much as 1 foot of water stood in terrace channels after some of the heavy rains. But this water was absorbed by the soil in less than 24 hours. There has been no visible movement of soil between the terraces. The terraces are closely spaced and cover crops or trash mulch is provided in most cases throughout the season."

Mulch Balk Treatment Produced Good Tobacco - T. L. Copley, Raleigh, N. C.

"Last month we reported the high erosion control effects of the rye-mulch balk treatment. Tobacco yields and values for the Rotation-Residue Management study have now been tabulated and results show that good tobacco was produced in 1951 under the mulch treatment. Both yield and value per acre was slightly better than that in any other of the 1-year rotations. This was of particular interest since there has been some concern over possible reduction in tobacco yields, due to competition from the balk growth. Apparently, the growth and maturity period of the rye is such that there is no competition with the tobacco. The rye matures before tobacco begins its maximum growth period.

"Root knot nematode infestation has become serious in all the plots of this experiment and soil fumigation this fall was necessary. The root knot index of the mulch balk treatment was much lower than other 1-year rotations which may have accounted for good yield and value of the tobacco. We have no explanation, however, for the low disease index. Root knot index was lower in the 2-year rotations than for most of the 1-year rotations."

Soil-Organic Matter Data - R. M. Smith, Temple, Tex.

"Some interesting soil-organic matter data for surface samples from crop rotation plots on one site has been obtained. The results are summarized as follows:

Sampling date	Cropping, rated as to intensity of cultivation			
	Row crops only	Small grains only	Grain plus clover	Clovers only
	Percent organic matter			
Original, Nov., 1948	2.61	2.63	2.70	2.75
Present, Oct., 1951	2.46	2.54	2.66	2.81
Change during 3 years	- .15	- .09	- .04	+ .06

"The changes shown are small but consistent. Each value is an average of determinations for either five or six plots. The decline of 0.05 percent of organic matter per year under clean cultivation is similar to the rates of decline which have been reported from other States. With normal C:N ratio this would account for a release of about 55 pounds of nitrogen per acre per year for corn or cotton, which is close to the amount required to grow 'normal' yields of these cultivated

crops in the Blackland, with no loss by leaching. We have not detected any soil structural changes associated with the cropping practices. This appears reasonable considering the smallness of the organic-matter differences.

"The data also show a difference of more than 2.0 percent of organic matter in the plow layer of two different cultivated Austin clay soils paired with native meadow. Over a reported period of 60 years of cultivated cropping this would correspond with a loss of about 40 pounds of nitrogen per acre per year from the top layer of soil. Differences below the plow layer are less in percentage but would approximately double the total amount lost. Both erosion and oxidation of organic matter are involved in these paired comparisons; whereas, in the rotation plots mentioned there was little or no erosion during the 3 years involved."

Evaluating the Character of Rains from the Hourly Precipitation Data - H. H. Finnell, Goodwell, Okla.

"A study was made of the possibilities of evaluating the character of rains from the hourly precipitation data provided us by the U. S. Weather Bureau .

"Since the best we could do with the data would be to try to establish a mean value for the district based on not more than one record for the past few years, another device which would enable us to carry out our policy of relying upon specific rainfall records in the immediate vicinity of the field test suggested the inclusion of rates of rainfall, based on the weekly distribution or the average fall per rainy day. A total of 687 observations in the North Dakota-Montana area was summarized, in comparison with 546 in the Southern High Plains area of Colorado and Panhandle Oklahoma.

"The occasional excessive rains which cause the principal amounts of runoff from the land appear to be significant in affecting the seasonal weekly average rainfall; on the other hand the gentleness of rains appears to be more adequately described by the average amount of rainfall per rainy day. It was concluded to add both these factors to the tabulation, and the retracing of our steps in order to do that has been started. While neither of these factors is conceded to give us what might be hoped from a summary of hourly precipitation records, they nevertheless have the virtue of applying specifically as to time and place to each individual field under study. I am hopeful that this approach will greatly increase the value of information derived from it."

Experimental Orchard - J. T. Bregger, Clemson, S. C.

"The 1951 peach crop was heavy on one set of plots (Annex) and not on the other (Elberta Block) due to a very unique situation at blossom time. Following an extended period of hot weather that brought all peach varieties into full or partial bloom, the weather turned cold and stayed cold for several weeks. During this time there was some rain and several frosts with the result that there was a type of embryo injury that didn't show up until late May. Following the normal 'May drop,' an abnormal fruit drop occurred on the Elberta variety but not on the Golden Jubilee variety. Fruit yields for Elberta were therefore below normal regardless of treatment but were normal for Golden Jubilee.

"Individual tree yields average above 5 bushels for all treatments except one. Even that one, however, gave a yield that would approach a carload of peaches per acre."

"It seems quite clear from the data that no treatment has curtailed tree size to the point that large differences exist between the soil management practices being studied. Such differences as do appear significant are in line with previous years and have to do with effects on the soil nitrogen rather than on the soil-moisture level. This is not clearly shown by the difference between mowing and disking a rye cover crop and in the high yields under such winter legumes as *Crotalaria spectabilis* and spotted bur clover when their residues are worked into the soil during the growing season."

Pasture Irrigation (Arnot) - G. R. Free, Itahaca, N. Y.

"Statistical analyses of yield data have been completed and some marked and significant increases in yields due to irrigation were noted. Ladino and orchard grass had been seeded in 1949. The 6-1/2 inches of supplemental water which was applied to plots receiving 300 lbs. per acre of 0-20-20 each spring caused a 32 percent increase in yield. This would be more impressive, however, if the level of yields were higher. It will be noted that the increase due to irrigation at the high fertility level was only 8 percent. The yields at high fertility level without irrigation were nearly double those at the lower fertility level with irrigation.

Table 1.--Arnot pasture yields (tons per acre oven dry) 1951

1951 treatments ¹	Rain only	Rain + irrigation	Increase due to irrigation
			Percent
A. 300# 0-20-20 in spring	1.53	2.02	32
B. 1,500# 0-20-20 in spring plus 40# N in spring and 40# after each cutting	3.97	4.29	8

¹All plots received manure in 1951 at 1-1/2 ton/acre in spring and after each cutting.

"Yields under the high fertility treatment (B) were about 46 percent higher than in 1950, and under the lower fertility level (A) were about 70 percent higher. Part of this increase is due to the difference in the number of days from the first fertilizer application in the spring to the date of the last cutting (146 in 1951 and 126 in 1950) and also to the number of cuttings (8 in 1951 and 6 in 1950). Rainfall was less in 1951 than in 1950, both on the basis of total for the period and also on a per day basis. Other factors complicating the comparison of yields for the 2 years are possible differences in temperature and sunshine, the addition of more lime to all plots in 1951, and the use of manure on all plots in 1951 to simulate droppings.

"The fact that irrigation substantially boosted yields at the lower fertility level and failed to give a significant effect at high level with nitrogen fertilizer is probably tied up with the difference in plant species. We have previously reported that legumes tend to disappear with heavy nitrogen fertilization at the Arnot. Apparently legumes on these soils are much more affected by dry weather at present than grass provided the latter is supplied with nitrogen. There is support for this idea in yield data for plots which in 1950 received the heavy fertilizer applications including nitrogen and in 1951 received none except for the manure. There were few legumes in 1951 and yields were at a low level with only a 7 percent response to irrigation.

"It is felt that an objective evaluation of the effects of either nitrogen or supplemental irrigation on a legume and grass pasture is not possible unless manure is used and the pH of at least the whole plow layer is at an optimum level for nitrogen fixation by legume bacteria. It remains to be seen at the Arnot whether the physical conditions of the soil and also the fertility status including lime and manure can be altered sufficiently to keep the legumes kicking out nitrogen even in dry periods. We know from results in 1949 that the moisture supply under extreme drought conditions will not be sufficient for top production even with an adequate nitrogen supply."

Wheat Yields from Cropping Systems - G. M. Horner, Pullman, Wash.

"The long-time effect of cropping systems on crop production is indicated by the yield of wheat grown on the crop-rotation plots. In the following table are summarized the average yields of wheat for the periods 1941-46 and 1947-51 as affected by two soil-building rotations and two soil-depleting cropping systems. The 1951 wheat crop was the first crop grown following the plowing of the soil-building crop in the first cycle of the longest (alfalfa) rotation.

Table 1.--Wheat yield trends as affected by crop rotations

Crop rotation	Wheat yield ¹ - bushels per acre		
	1941-46	1947-51	Difference
Alfalfa and grass (4 yrs.) - wheat - wheat - peas - wheat	33.7	34.6	+0.9
Sweet clover and grass - green manure - wheat - peas - wheat	37.3	38.3	+1.0
Wheat - peas for seed	26.7	25.3	-1.4
Wheat - summer fallow	28.5	23.2	-5.3

"Wheat production for the alfalfa and sweet-clover rotations was slightly higher during the 1947-51 period than for the preceding 6 years. However, there was a downward trend in yield for the other two rotations. The summer fallow treatment caused a marked decline in production. High erosion losses and depletion of soil-organic matter on plots of the last two rotations (especially the fallow treatment) are the principal causes of this decline in productivity as compared to the production maintained by the conservation treatments."

Land Use in a Defense Economy - E. L. Sauer, Urbana, Ill.

"The ratio broadcast entitled 'Land Use in a Defense Economy,' pointed out the land-use problems created by (1) the defense economy needs for high level agricultural production, (2) the intensive land use for the past 8 to 10 years which has depleted organic matter and accelerated erosion, and (3) the need for sound land-use and improved rotations in order to decrease erosion and increase yields and farm production per acre and per farm. It was pointed out that most of the land that has been intensively cropped in recent years, particularly to corn and soybeans, is producing and returning considerably less income than it would if a sound land-use and improved practice program and appropriate livestock programs were put into effect. The discussion emphasized the individual farm approach for making adjustments and the necessity of adjusting land use to the capabilities of the land. Investments in fertilizers and erosion-control practices helped to increase needed production. A complete soil and water conservation farm plan pays

off in increased farm production and in higher net farm income."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio

"November 1951 was one of the coldest Novembers on record. Frost penetration of 2 inches observed this month was the greatest in 13 years for November.

"Mr. Dreibelbis reports that the organic-matter content of the soil in the mulch plots at the end of two complete 4-year rotations was slightly higher than that of the plowed plots to a depth of 4 inches and somewhat less at the 4- to 7-inch depth. This is illustrated in the following table:

Soil depth	Organic matter (plots E,F,G)	
	Plowed	Disked (mulch)
Inches	Percent	Percent
0-1	4.08	4.68
1-4	2.36	2.61
4-7	1.94	1.75

Sampled April 11, 1951, before disturbing the 2-year old sod for corn.

"Organic-matter determinations on poor and improved pasture watersheds in 1942 and 1951 show, in the following table, the effect of such improvement. There was no organic matter added to either pasture area. Both pasture areas were clipped for weed control each year. Although no records of animal-use days per acre were kept, the area improved in 1947 carried more animal days per acre than the poor-cover area.

Sampling date	Watershed No.	Practice	Organic matter ¹ (pct.) in soil depth of -			
			0-1"	1-4"	4-7"	0-7"
1942- Apr. 21	129	Improved ²	-	-	-	2.49
1951- Apr. 11			3.24	3.13	2.94	3.06
- Sept. 9	135	Poor ³	2.88	2.72	3.50	3.08
1942- Apr. 21			-	-	-	2.31
1951- Apr. 11			2.13	2.10	2.36	2.22
- Sept. 9			2.17	2.06	2.30	2.18

¹Total organic matter determined chemically by the chromic-acid titration method.

²Bluegrass prior to 1947, alfalfa, ladino clover, brome grass thereafter.

³Poverty grass, broomsedge, and briars.

"Erosion is negligible from these two pasture areas and surface runoff is very small. There appears, however, to be some change in the amount of runoff caused by the improvement in the type of grass cover and organic matter increase in the improved area as indicated below. The improved watershed formerly had more runoff than No. 135. Now it has less - an over-all difference from +0.25 to -0.05 making a total of 0.30 inch change in runoff per year."

Period (May - September)	5-month total runoff (inches)		
	Watershed 129 (improved)	Watershed 135 (poor)	Difference between No. 129 and 135
Before improvement			
1941	1.12	0.63	+0.49
1942	.08	.06	+ .02
1943	.22	.11	+ .11
Average	.52	.27	+ .25
After improvement in 1947			
1949	0.11	0.14	-0.03
1950	1.09	1.20	- .11
1951	.01	.01	0
Average	.40	.45	- .05

Hydrologic Studies - R. W. Baird, Blacklands Experimental Watershed, Waco, Tex.

"J. B. Pope reports that early fall plowing after crop harvest in the Y area with conservation practices in comparison to late destruction of cotton stalks and late plowing in the W area has made a considerable difference in the moisture conditions of the two areas as is shown in the percentages of moisture from samples taken on November 14. This is the first time this season that there has been much difference in the moisture conditions. The percentages of moisture on the cultivated areas at the designated depths were as follows:

Y-10, Area: 0-6 inches, 27.1 percent; 6-12 inches, 27.5 percent; 12-24 inches, 28.6 percent; and 24-36 inches, 27.4 percent.

W-10, Area: 0-6 inches, 22.9 percent; 6-12 inches, 23.5 percent; 12-24 inches, 24.7 percent; and 24-36 inches, 22.5 percent.

"Fall seeded oats and clover are looking good and for the first time since 1949 will furnish winter grazing during favorable weather. The cattle were turned on the oats the 3d of December"

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nabr.

"On November 26, we had 0.52 inch of precipitation in the form of snow and rain which was the only measurable precipitation received during the month. This brings the total precipitation to 35.96 inches for the first 11 months of the year. The highest yearly precipitation on record at Hastings is 40.60 inches in 1915. Despite the high rainfall received this year there are drought periods totaling 70 days. A drought period is considered a period in excess of 14 days

in which there is not 0.25 inch or more of precipitation in 24 hours.

"The need for obtaining additional hydrologic data such as are being collected on this project was brought out by members of the subcommittee on Runoff and Sedimentation for the Missouri Basin Resources Development in Lincoln at a meeting on November 14. The Kansas River District also need additional data. They wrote that TP-69 was being used by them in the design of peak rates of runoff in their district and are interested in future publications.

"We anticipate cooperating with the Tornado Project of the Weather Bureau in Kansas City in the operation of a barograph, hydrothermograph, and a recording rain gage at the Meteorological Station for the period February 1, 1952, to September 1, 1952. We have these instruments in operation at the station but the temperatures, humidity, and barometric pressures are recorded on weekly charts and the Tornado Project desire them on 12-hour charts. Since the project has been established we have furnished the Weather Bureau in Lincoln copies of the meteorological data which have been obtained, always retaining the original charts and readings.

"There has been no exchange in funds for this service but we feel that it is to the best interest of the Government that we render this service.

"Silt was cleaned out of the main channel below gaging station W-11. These deposits were due to a dam, which was built during the war, about 3/8 mile below the station. Due to faulty design this dam has been failing since 1946 with complete failure last summer. The pool below the station was drained and 362 Bull Heads were salvaged, 35 of them were eatable size, and the balance were used to stock a farm pond on the project area.

"The average yields for 1951 of corn, oats, and wheat under the various land-use practices are as follows:"

Table 1.--1951 average yield-bushels per acre on approximately 4-acre watersheds corn, oats, and wheat

	Straight row	Contoured	Subtilled
corn	36.8	55.4	39.0
oats	11.2	12.3	13.7
wheat	6.7	6.9	7.0

Hydrologic Studies - G. A. Crabb, Jr., East Lansing, Mich.

"On November 2 the acting project supervisor, in company with Messrs. Kenworthy and Kidder, made a survey of orchard conditions in the Traverse City area. The survey was made for the purpose of starting much needed research in supplemental irrigation in cherry orchards. The orchards and possible water supplies of Mr. Paul Shaw were gone over in considerable detail. Mr. Shaw is willing to install the necessary equipment for the irrigation of all his orchards if Mr. Kidder feels that it is economically advisable, in view of the fact that the water supplies must be lifted about 150 feet and piped 1/2 mile. This equipment could then be used in connection with any type of research that interested personnel would wish to undertake. Mr. Kidder is investigating the advisability of installing the irrigation equipment in Mr. Shaw's orchards.

"The Hydrologic Advisory Committee of the Agricultural Experiment Station having agreed to the plan for cultural change on the wooded watershed, pictures of present cover were made on November 21. On November 26 a conference was held in the Project offices with Dr. Stevens and Mr. Smith of the Forestry Department, Mr. Stolzy and Mr. Crabb of the Project to discuss the institution of changed cultural methods on the wooded watershed. The advice of the Advisory Committee was followed, and it was mutually decided to immediately clear-cut the wooded watershed, in a manner similar to that followed commercially throughout southern Michigan, i. e.; cutting all trees down to the 5-inch diameter class, utilizing trees 10 inches and larger in diameter for sawlogs, those 6 to 9 inches for cordwood, and similarly cutting a 50-foot isolation strip around the watershed to eliminate edge-effect. Such a change would give additional data on the effects of watershed management on soil and water losses, and would not change the instrumentation and use of the watershed by either the Project or the Rose Lake Wildlife Experiment Station. Oral clearance was received from the Washington Office for this modification of present watershed plans, and an amendment to the working plan prepared. Cutting operations commenced November 27.

"November 26 Geo. A. Crabb, Jr., reported for duty after more than a year's absence. He was recalled to active duty in Japan and Korea by the U. S. Navy in 1950."

Hydrologic Studies - R. B. Hickok, Lafayette, Ind.

"The following table reports the 1951 corn yields on the experimental watershed:

Table 1.--1951 corn yields from experimental watersheds, Purdue-Throckmorton Farm, Lafayette, Ind.

Treatment	Wsd. No.	Yield est., Bu/A ²	
		Mean	Std. error
Conservation	2	113	2.3
	11	113	2.9
	Av.	113	0
Prevailing	4	70	2.6
	12	71	1.5
	Av.	70	0.50
Treatment diff.		43	Significant

¹Conservation treatment included contour cultivation, approximately 6 tons manure and 1,000 lbs. 8-8-8 fertilizer per acre, plowed under, w/150 lbs. of 3-12-12 in row, following Alf.-R.Cl.-Als.-T. meadow (1-yr.). Prevailing treated corn was straight-rowed, w/150 lbs. of 3-12-12 in rows, following R.Cl.-T. meadow (1-yr.)

²Samples - 7' x 7' at 50' x 50' intervals, corrected to 17-1/2 percent moisture.

"The season was not a particularly favorable one for corn. The early summer was cool and the latter part of the growing season was rather dry. The yield of the conservation-treated watersheds exceeded their averages for the previous 8 years of the experiment by 6 bushels per acre. The yield of the prevailing watersheds was 2 bushels per acre less than the previous 8 years. The difference in yields

between the two treatments' year was 9 bushels greater than the 9-year average difference of 34 bushels per acre."

Hydrologic Studies - A. W. Cooper, Auburn, Ala.

"The November rainfall of 3.10 inches represents 91.5 percent of the 70-year average of 3.39 inches for Auburn. There was no runoff from the erosion plots in November.

"Most of the first part of November was spent in making calculations of crop yields on and of runoff from the erosion plots and of infiltration and available water-holding capacities of Alabama soil from data that had been collected prior to this month. Considerable time was spent in putting the data in permanent record form. Yields from the erosion plots are reported in tables 1 and 2."

Table 1.--Cotton yield and stalk residue on erosion plots

Plot No.	Slope	Treatment	Yield		
			Seed cotton	Stalk residue ² Green weight	Dry weight
	Percent		Lbs.	Lbs.	Lbs.
2	5	2-year rotation ³	1,767	9,720	2,960
7	10	3-year rotation ⁴	1,007	5,670	2,010
8	10	3-year rotation ⁴	1,361	7,570	2,720

¹Rotations have not been in progress long enough to affect yields.

²The stalk residue was chopped and left on the soil surface.

³2-year rotation - cotton-rye grass, crimson clover, and Sudan grass.

⁴3-year rotation - cotton-fescue, Ladino, oats-fescue, Ladino.

Table 2.--Corn yield and stalk residue on erosion plots

Plot No.	Slope	Treatment ¹	Corn	Yield	
				Stalk residue ² Green weight	Dry weight
	Percent		Bu.	Lbs.	Lbs.
4	5	2-year rotation ³	37.1	3,190	2,230
6	10	2-year rotation ⁴	31.0	3,310	1,920
9	20	Continuous corn ⁵	101.0	4,930	2,860
10	20	Continuous corn ⁶	66.8	3,770	2,185

¹Rotations have not been in progress long enough to affect yields.

²The stalk residue was chopped and left on the soil surface.

³2-year rotation - cotton, crimson clover-corn.

⁴2-year rotation - cotton, crimson clover-corn.

⁵Continuous corn, crimson clover - 1,000 pounds 6-8-4, 500 pounds nitrate of soda plus irrigation.

⁶Continuous corn, crimson clover - 250 pounds 6-8-4, 125 pounds nitrate of soda.

Hydrologic Studies - T. W. Edminster, Blacksburg, Va.

"Mr. Holtan analyzed several of the larger storms and subsequent runoff from the control plots here in Blacksburg. These analyses are being made in an effort to add to a backlog of data from infiltrometer studies performed in the Midwest on detention-discharge relationships of overland flow.

"Subject to rechecking, it appears that overland flow is turbulent in the lower flows, laminar when a certain depth is reached, and turbulent again as still greater depths are reached. Plotted to logarithmic scales the slope-intercept formula for these data becomes:

$$q = a(k + D)^n$$

Wherein q = rate of runoff in in/hr.

D = Average depth of detention in inches

a = intercept i. e., value of q at $D = 1.0$

k = constant which when added to D values gives good adherence to a straight line relationship on logarithmic paper

n = arithmic slope of the relationship

"In the sub-laminar range of turbulent flow the k values were derived, by trial and error, which straightened the relationship and resulted in a common slope of $n = 1.667$. Under these conditions, the k and the resulting a values were related to plot characteristics by calculation of a multiple regression. For these data significant factors are:

$$a = 61.755 - 0.399 (\% \text{ cover density}) + 4.887 (\% \text{ slope})$$

$$\text{and } k = 0.013541 - 0.000749 (\% \text{ slope}) + 0.031763 (\text{infiltration rate}) \\ - 0.000018(a)$$

"The significant effect of infiltration rate on k indicates that in these hydrograph analyses derived detentions, were less than true detentions by the amount of infiltration occurring during the recession period. (In these analyses detentions were derived without the usual correction for infiltration.)

"More work needs to be done as soon as data become available. Length of slope is undoubtedly a factor on both a and k . Also these analyses should be applied to laminar flow and turbulence-due-to-velocity range of flow. The sub-laminar turbulence treated herein is assumed to be due to small projections into the flow from the plot surface."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minn.

"Mr. Donnelly has completed a total of 116 tests on the outlet for the straight drop spillway. During the last month, tests were made using a 1:12 scale model of a spillway having a 10-foot drop and a 6-foot head on the spillway. He is trying to determine the block, longitudinal sill, and end-sill heights and locations. His tailwater depth was $2d_c$ above the stilling basin floor. Attempts have been made to keep the tailwater level as low as possible in order to simplify the field installation. Some of the photographic data have not been returned to us but from memory it appears that the bed scour is satisfactory but the bank scour is excessive. Good bank conditions can be had by using wingwalls which are parallel

to the basin sidewalls but the maximum scour next to the wingwall is about 5 feet more than is desirable. If the tailwater depth is raised to 2.5d_c from the floor the bank and bed scour is satisfactory with flaring wingwalls. His study is not going as rapidly as we desire because of difficulties which are directly traceable to our efforts to keep the tailwater at the lowest possible level, as requested by the field engineers."

Hydraulic Studies - W. O. Ree, Stillwater, Okla.

"Casting of the weir sills to be used in the culverts for the runoff studies was started. The equivalent of two complete sets has been cast. These will be placed in the culverts as soon as weather permits.

"A model has been constructed of the weirsill. This model is arranged so the effect of different culvert floor slopes can be tested. The model culvert width is 16 inches. To date slopes of 0, 1, 2, 4, and 6 percent have been tested. The data are being analyzed at the present time. Preliminary results indicate that the weir sills cannot be used on culverts having slopes greater than 4 percent.

"The large weeping lovegrass channel was tested during the month. This channel is 40 feet wide and about 400 feet long. Its cross section is triangular with side slopes of 10 to 1 and a depth of 2 feet. The upper part of the channel has a slope of 3 percent and the lower of 6 percent. When previous tests were made on this channel the center portion of the upper reach was predominantly Bermuda grass. The results therefore were not applicable to weeping lovegrass channels. This situation was corrected by transplanting lovegrass clumps into the center part. The recent experiment was made therefore on a good lovegrass channel.

"Testing of the pipe outlet was resumed the latter part of the month. The purpose of these new tests is to check the experiments on the pipe spillway with the 8-foot drop-inlet riser. The previous experiment gave rather erratic results. In this second attempt steady flows are being used. Since a long time is needed to achieve a steady flow it is possible to run only one test a day. Difficulty in determining the flow rates has been encountered. Current meters are now being used to measure the discharge rates. Progress has been rather slow on this check experiment because of the long time to achieve steady flow, because of the additional measurements needed, and because of the cold weather. It is now necessary to drain all lines and manometers when shutting down for the night."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Ga.

"W. B. Land reports the hydrologic measurements in November as follows: Rainfall, Nov. 1, 0.28 inch; Nov. 3, 0.48 inch; Nov. 6, 0.65 inch; Nov. 14, 0.52 inch; Nov. 15, 0.06 inch; and Nov. 27, 0.13 inch; for a total of 2.12 inches. Normal rainfall for November is 2.91 inches.

Pimiento Pepper Yields - "W. B. Land reports that harvesting pimiento peppers from the irrigation plots was completed October 17. Three levels of soil moisture were maintained as follows: (1) high level by irrigating to keep the level above 65 percent available soil moisture; (2) low level by irrigating to keep the soil moisture above 35 percent available; and (3) no irrigation. Yields of the peppers from these three treatments were as follows:

	Total	Good fruit only	
	tons/acre	tons/acre	% of total
No. irrigation (check)	2.41	1.97	81.7
Low level	5.16	4.94	95.7
High level	7.00	6.80	97.2

"The irrigation increased both the total production of fruit and the percent of usable fruit.

Pasture Irrigation at Lewisburg, Tenn. - "The following report was received from Mr. A. G. Van Horn, Superintendent, Dairy Experiment Station, Lewisburg, Tenn. 'We have partially worked up the data on our irrigation plots and some of it may be of interest to you. From April 1 through September, the irrigated plots produced milk at the rate of 12,632 pounds 4 percent fat corrected milk per acre and the nonirrigated plots produced 8,444 pounds. The market value of the milk from the irrigated plots was \$551.36 per acre and that from the nonirrigated plots, \$361.21.

"According to my computations, 24.33 inches of water was applied to the irrigated plots during the months of May through October. I figure 16.2 gallons per minute for the full circle sprinklers and one-half that amount for the past circle sprinklers."

Drainage Studies - M. H. Gallatin, Homestead, Fla.

"Rains during the summer and early fall were not of sufficient intensity to flush the chlorides out of the contaminated coastal marl area. While no samples from our intrusion lines have been collected since September, we have during the past period, run a few samples for farmers and results of this analysis are that the concentration at the end of November is as high as it was at the end of March last year. The peak concentration usually occurs in February or March. Unless heavy rains occur there is no doubt that the damage to crops will be greater this year than last year and some of the lands close to the bay farmed last year will have too high a concentration of chloride to produce even the most tolerant crops."

Drainage Studies - E. G. Diseker, Raleigh, N. C.

"For the past 3 years it was noted that on a number of plots, located in various sections, deeper drainage occurred on areas cultivated to corn than that on areas in soybeans. Dr. Lutz's porosity studies revealed the same; hence, the eastern half of Plot E (tiled area) was planted to soybeans in rows across all tile lines, during the past year. The western half was planted to corn. Soybean yields are listed in the table below:

Table 1.--Average yields of soybeans on a portion of the drainage experiment plot E (tiled areas) at the Tidewater Experiment Station - 1951

Tile depth	Tile spacing	Soybean yields
Feet	Feet	Bushels per acre
2	50	37.0
2	75	33.4
2	100	33.8
3	50	35.8
3	75	36.1
3	100	37.8
4	50	33.3
4	75	35.1
4	100	35.4

"Three samples were taken at the mid-point between tile lines on each plot. The beans were in rows 39 inches wide. The rows were on the eastern half of the plot, across all tile lines at a 90-degree angle.

"There appears to be no great contrast between soybean yields on the above plots. Precipitation during the past year was relatively low. Had precipitation been normal, or high there may have been considerable difference in yields. The difference shown above is in favor of the wider spaced plots."

Drainage Studies - I. L. Saveson, Baton Rouge, La.

"Severe low freezing temperatures in the cane area of Louisiana has badly damaged the 1951 crop.

"The past summer it was comparatively dry and rains in the latter part of October induced late cane growth, reducing the sucrose content of the cane. This delayed the start of grinding approximately 1 week. Most of the mills started grinding around October 26. At that time planters had to top their cane very low in order to get a standard test of 12 percent sucrose.

"On November 3, in the northern part of the area, approximately one-third of the sugarcane area has a low temperature of 25.5 degrees. The immature cane was badly frozen. The temperatures on November 8 was 26 degrees and November 9, 27 degrees. This covered the larger part of the cane area causing further freezing damage. On November 15 and 16, the temperature raised to 85 degrees which was inducive to the cane souring. On November 18, the temperature dropped to 23 degrees, November 19, 25 degrees, and November 20, 23 degrees. This freeze completely killed the cane that was not previously frozen.

"A number of the mills are still making sugar, getting approximately 125 lbs. of sugar per ton of cane and 8 to 10 gallons of molasses. Normally they get from 165 to 200 lbs. per ton of cane. In order to recover 125 lbs. of sugar, the cane is topped very low leaving approximately one-half of the cane stock in the field. The mills contemplate making sugar until the sugar produced per ton of cane drops below 100 lbs. per ton of cane. They will try to salvage the rest of the crop into sugar molasses. It is estimated that the loss will run from 40 to 50 percent of the crop. None of the test areas of the project have been harvested to date. The results for this year can only be on a relative comparable tonnage basis with check areas.

"Some preliminary sucrose tests for grinding on a flat planted area versus row planting for one variety, showed approximately one point increase over the row planting. These tests are not conclusive but will be given a more complete study on the flat planted areas next year. The following is a tabulation of the above tests:"

Variety :		Flat :				Row			
		:Brix	:Acidity	:Sucrose:	Purity	:Brix	:Acidity	:Sucrose:	Purity
10/19	34-120	13.00		7.91	60.85	14.00		9.10	65.60
10/19	36-105	14.90		10.40	69.80	14.30		9.52	66.57
11/13	34-120	16.20		11.80	73.33	14.80		10.33	69.80
11/13	36-105	17.50		13.32	76.11	16.80		12.83	76.37
5-1/2 joints off									
11/28	34-120	15.80	2.5	12.57	79.56	15.20	3.1	11.37	74.80
7 joints off									
11/28	36-105	16.20	2.7	12.61	77 84	16.00	3.0	12.76	79.75

Drainage Studies - T. W. Edminister, Blacksburg, Va.

"Mr. Walker reports that a paper entitled 'Depth and Spacing for Drain Laterals as Computed from Core Sample Permeability Measurements' was completed and submitted to the Washington Office for clearance. It is to be presented to the Amer. Soc. Agri. Engin. on December 19.

"Arrangements were made with the State Office for securing funds, supplementary to the project's budget, that are necessary for grading one 'cut' of land on the Norfolk City Prison Farm. Detailed plans with the Prison Farm and Work Group personnel are being put into action.

"Water-table measurements have been collected from this cut of land for 3 years. During this time the ground surface has been higher near the ditches than in mid-areas, thereby creating very poor surface drainage conditions. It is believed that much useful information can be obtained by taking water-table measurements under good surface-drainage conditions and comparing the results with those obtained before grading the surface.

"Perhaps the most significant development during the month was the recognized need for additional information from permeability measurements to answer specific questions. Most of the present routine laboratory measurements are conducted under constant heads and tensions. According to the concept of water movement into drain laterals as developed by this project, the tension drawing water to drains decreases as the water-table recedes. Tests should be included in the laboratory procedure which will determine the effect of varying tension on percolation rates and porosity measurements. It is hoped that preliminary tests of this nature may be conducted by this project within a few months."

Sedimentation Studies - R. Woodburn, State College, Miss.

"During the month Mr. Burford investigated the effect of the Waring Blendor on the break up of sand during mechanical analysis work in laboratory. Previous inconsistencies in results had led to the suspicion that some sand was being broken up in the high speed shaker. This was confirmed by these tests. One hundred grams of washed oven dry sand graded between 50 to 100 mesh U. S. Standard dry sieve Ro-Tap method were used in the tests. After stirring for time intervals shown below in about 400 cc. of water, the suspension was gently washed through the sieves and amounts retained, (dry weight) are shown in the table.

<u>Blending time</u>	<u>Weight retained</u>	<u>Retained 140</u>	<u>Retained 270</u>
<u>Minutes</u>	<u>100 mesh-grams</u>	<u>Mesh-grams</u>	<u>Mesh-grams</u>
2 ¹	99	Trace	Trace
0	100	Trace	Trace
2	91	1	2
5	89	1.5	2.5
10	83	2	3

¹An ordinary kitchen rotary egg beater was used.

"It may be noted that only 83 grams out of the original 100 were retained on the 100-mesh sieve which was the significant size for these tests. Actually 12 grams

were below the 270 mesh or 53 micron size and thus reduced into the silt range after 10 minutes of stirring with the Blender.

"Samples of gully soils were collected and rainmaker tests were made on them in the erodibility study. Thus far, gullies in Carroll County, Sparta sand formation - Lafayette County Tallahatta formation - Pontotoc and Union Counties - Pontotoc Ridge province, have been investigated. The results of these tests are shown below:

"In the design of impounding structures for sediment and water, it is very important to have some idea of the magnitude of sediment-production rates.

"Thus far major attention has been focused upon determination of rates from the most critical areas of the watersheds, that is, the permanently bare areas such as road slopes and gullies.

"Measurements have been made upon various gullies by means of dams constructed below the gullies for trapping and cross sectioning all the sediment produced. It seems likely that gullies in formations not yet measured by trapping the sand may be compared with the measured gullies by means of the erodibility rates of the soil materials from gully to gully.

"One method of measuring erodibility is on the basis of resistance to raindrop splash action since virtually all material splashed loose by raindrop action is ultimately carried away by the efficient channel system of the gullies.

"A study has been under way for some time comparing various gully soils by means of splash losses from natural rains. Nine-inch diameter cores of undisturbed gully soils from several North Mississippi sites are set up in a comparison at State College. Several more months may elapse before any data are available from this study. Three and one-half-inch diameter cores were also taken in the gullies and were exposed to controlled rainfall with a small rain simulator at State College.

"One hour of rain at about 6-1/4 inches per hour was used in all cases. The technique was described in an article entitled 'The Effect of Structural Condition on Soil Detachment by Raindrop Action' by Russell Woodburn, April 1948, issue of Agricultural Engineering.

"The results from the tests on the cores are shown in the following table. The loss of weight by splash action following 1 hour of rain and also the volume weight of core is given.

"It now seems desirable to determine the clay content of each soil material in order to better understand splash resistance. Plans have been made to run mechanical analyses of all the materials. When the mechanical analyses data are available, the results can probably be better interpreted. However, it is of interest and probably of considerable significance that the gullies in all formations studied show a great similarity. The high sand-content strata are the most erodible and are quite similar from one geologic formation to another. Sand is by far the greatest part of the sedimentation problem in the Yazoo Watershed. It would, therefore, appear at this time at least, that sediment production rates for design purposes will not greatly differ over most of the watershed.

"Obviously this problem needs somewhat more detailed analysis since most of the gullies have other strata in addition to the loose sand. This will be studied

further and particularly with reference to the over-all rate shown by the measurements in debris basins or sand traps when available.

"Investigations are now under way to relate splash loss and erosion rate in tons per year by means of the debris-basin measurements and splash studies of the same soils.

"Erodibility rates are needed on many sites in the Yazoo Watershed especially where the surveys were made of reservoir sediment. The work on gully soils may be considered as a pre-requisite to further studies on upland ungullied areas. Generally, the gully soil materials present fewer complications for study of erodibility rates and are therefore most favorable for development of technique.

Table 1.--Measurement of relative erodibility of some gully soils by raindrop splash. Erosion rates - grams per hour and inches per hour from 3-1/2-inch diameter cores of undisurbed soil structures

	Vol. wt.	Erosion loss by splash	Erosion loss
		<u>Grams</u>	<u>Inches</u>
Tallahatta Formation			
Berkeley Mitchell Farm, gully 1E	-	-	-
Topsoil - silty clay	1.376	35.8	0.174
Cemented-sand-clay	1.710	104.6	.409
Fairly loose - red sand	1.565	129.3	.552
Berkeley Mitchell Farm, gully 3W			
Very loose sand	1.441	139.9	.649
Pontotoc Ridge - South			
Hobson Place			
Very loose sand	1.585	151.1	.638
Russell Place			
Very loose sand	1.516	149.8	.661
Warren Place			
Red Sandy-Clay 10/31/51	1.718	81.4	.317
Red Sandy-Clay 11/9/51	1.696	74.1	.292
Loose Yellow sand, site 1	1.478	140.4	.635
Loose Yellow sand, site 2	1.475	134.7	.611
Pontotoc Ridge - North			
Crumpton Place			
Topsoil - silty clay	1.642	69.4	.283
Cemented - red sand 4' down	1.658	73.9	.298
Cemented - red sand 7' down	1.607	103.0	.429
Sparta Sand Formation			
Carroll county gully			
2-3/4 mi. N. W. of Carrollton			
Silty material - 8" down	1.417	47.0	.222
Mottled silt material - 8' down	1.534	52.0	.227
Hard red sand	1.788	123.4	.461
Silty clay - near gully floor	1.572	76.8	.327
Loose white sand	1.491	139.8	.627

Note: All cores of soil were saturated by capillarity as completely as possible prior to being subjected to simulated rainfall, for 1 hour at the rate of approximately 6-1/4 inches per hour.

IRRIGATION ENGINEERING AND WATER CONSERVATION DIVISION

Irrigation Water Supply, Tehachapi Soil Conservation District - W. W. Donnan, Los Angeles, Calif.

"Some time was spent in calculating the mean annual runoff of the upper watershed to the valley floor of the Tehachapi area. The 50-year isohyetal map was used to determine mean annual rainfall on the watershed. Using Troxell's curves of optimum natural water losses for South Coastal Basin watersheds, we arrived at a mean watershed runoff of 2.10 inches. In order to check this figure we attempted to compare this runoff to flow in the Kern River. The U. S. Geological Survey gages the 2,400-square-mile Kern River watershed flow at Bakersfield and again upstream at Kernville and Isabella. By subtracting the Kernville and Isabella flow from the Bakersfield flow we secured flow from 600 square miles of small foothill and mountain watersheds adjacent to and similar in characteristics with the Tehachapi Basin. The 40-year mean runoff from this 600-square-mile area averaged 2.00 inches per year. Therefore, we believe our estimates for Tehachapi are adequate. It is interesting to note that the runoff to the valley floor of 2.10 inches yearly produces a mean recharge of only about 5,000 acre-feet in Tehachapi Valley. This is about 50 percent of the present estimated yearly extractions."

Irrigation Studies - D. W. Bloodgood, Austin, Tex.

"The total amount of water available for use by rice during 1951 was 3.04 acre-feet per acre.

"Since the ditches and borders were continually full most of the time during the irrigation season, the deep percolation losses were normal, and the fields being drained only at the end of the season (approximate runoff of 4 inches to facilitate drying and harvesting), the total water subject to evaporation and plant transpiration during the season may be considered to be 2.79 acre-feet per acre.

"The evaporation losses from a free water surface and from a Division of Irrigation screened ground pan located at cooperative Prairie View Experiment Station evaporation station about 25 miles north of Brookshire (coefficient of 0.92) for irrigation season from May 15 to August 14 (91 days) were 19.44 inches (recorded 21.13 inches), or 1.62 acre-feet. The transpiration losses would, therefore, approximate 1.17 acre-feet per acre."

Weber Basin Investigations - W. D. Criddle, Boise, Idaho

"During the month, the final report on Weber Basin Investigations in Utah was completed by W. W. Donnan and W. D. Criddle. These investigations were on the proposed Bureau of Reclamation Project and consisted of a study of the water supply, land-development costs, and drainage requirements for the lands included within this project. The report was prepared for the Secretary of Agriculture."

Soil Piping Near Roll, Yuma County, Ariz. - K. Harris, Phoenix, Ariz.

"The Yuma Work Group of the Soil Conservation Service had called to our attention and had taken us to inspect a series of cave-ins on lands that at one time had been farmed but now were lying idle. This land is located in Sec. 36, T7S, R16W.

"The cave-in conditions on this land are similar in every way to the so-called piping condition found on the Yolo Ranch located in Sec. 12, T6S, R13W. The two

areas are located about 20 miles apart.

"In the Yolo area, it was found that the clay layer had a slope toward the river of 2 feet per thousand. In the Roll area, the slope of the retarding layer was not determined, but in all probability there was sufficient slope to produce this piping condition.

"The soils of this area are very high in silt in all parts of the profile."

Row Irrigation Studies in Cooperation with the Technical Committee on Development
Farm in the Frenchman-Cambridge Irrigation District - F. B. Hamilton, Lincoln, Nebr.

"The average maximum consumptive use rate was approximately the same this year as it was in 1950. The rate was 0.25 in/day in 1950 and 0.26 in/day in 1951. The total consumptive use was 16.5 inches of water in 1951 and 21 inches of water in 1950. Climatic conditions this year were favorable for crop growth with low consumptive use. Irrigation practices, i. e., stream size and length of run had no significant effect on the corn yields."

2/1/52

